

**To:** Kappelman, David[Kappelman.David@epa.gov]  
**From:** Wharton, Steve  
**Sent:** Sun 8/30/2015 9:17:36 PM  
**Subject:** Re: Links to USGS sediment core studies on mine tailings in the Animas River in Silverton, CO

Thanks David.

Sent from my EPA iPhone

On Aug 30, 2015, at 12:48 PM, Kappelman, David <[Kappelman.David@epa.gov](mailto:Kappelman.David@epa.gov)> wrote:

FYI

David Kappelman

USEPA Environmental Response Team

cell 513-240-6840

**From:** Turner, Philip  
**Sent:** Sunday, August 30, 2015 12:38 PM  
**To:** Bhattacharya, Dipanjana; Milburn, Anna; Fagen, Elizabeth  
**Cc:** Kappelman, David; Smith, Monica; Crossland, Ronnie  
**Subject:** FW: Links to USGS sediment core studies on mine tailings in the Animas River in Silverton, CO

May be of use when thinking about historic data

**From:** Hunt, Laura  
**Sent:** Sunday, August 30, 2015 9:51 AM  
**To:** Turner, Philip; Rauscher, Jon  
**Subject:** Links to USGS sediment core studies on mine tailings in the Animas River in Silverton, CO

[http://toxics.usgs.gov/pubs/wri99-4018/Volume1/sectionA/1202\\_Church/pdf/1202\\_church.pdf](http://toxics.usgs.gov/pubs/wri99-4018/Volume1/sectionA/1202_Church/pdf/1202_church.pdf)

[http://toxics.usgs.gov/pubs/wri99-4018/Volume1/sectionA/1213\\_Vincent/pdf/1213\\_Vincent.pdf](http://toxics.usgs.gov/pubs/wri99-4018/Volume1/sectionA/1213_Vincent/pdf/1213_Vincent.pdf)

Not sure if you have seen these studies conducted by USGS in Silverton, Co. They analyzed core samples and used geomorphologic mapping methods to identify old pre-mining sediments from the Animas River. Some findings:

- Using vanadium as a lithologic tracer for sediment derived from natural erosion of the watershed, we estimate that the fine fraction of streambed and floodplain sediments deposited after 1900 A.D. contain, in general, two-thirds tailings and one-third natural sediments
- Preliminary analysis of the geochemical data, when coupled with both the historical and geochronological record, clearly show that there has been a major impact by historical mining activities on the geochemistry of the fluvial bed sediments.
- The impact of historical mining activity is clearly recorded in the sedimentological record as shown in the study of sediments from the trench section (Vincent and others, 1999).
- Historical mining activity has resulted in a substantial increase in metals in the very fine sand to clay sized component of the bed sediments of the upper Animas River, and Cement and Mineral Creeks.
- Enrichment factors for metals in modern bed sediments, relative to those sediments that are clearly pre-mining in age, range from a factor of 2 to 6 for arsenic, 4 to more than 10 for cadmium, 2 to more than 10 for lead, 2 to 5 for silver, and 2 to more than 15 for zinc.

Might be helpful for the proposed core sampling.

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Laura Hunt, PhD

**U.S. EPA Region 6**

**Water monitoring and assessment section (6WQ-EA)**

**1445 Ross Avenue**

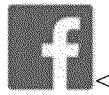
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